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SOME NOTES UPON ECONOMIC PERONOSPOREÆ FOR 1889 IN NEW JERSEY.

By BYRON D. HALSTED.

Early in the season as announced in the *Botanical Gazette* for June, page 152, a peronospora was found upon cucumber leaves growing under glass here in New Brunswick. The disease assumed a violent form, and in the course of a few weeks all the vines were dead. Squash seed was afterwards sown in the same bed to determine whether the peronospora would develop upon this near relative of the cucumber. In the meantime the mildew, which seemed to be new, was studied; the method of germination by zoospores, and other points were determined and specimens with drawings were afterward sent to Dr. Farlow.

An account of this peronospora was given by Dr. Farlow in the *Botanical Gazette* for August, page 189, in which it was stated that the same species had been found a few months before in Japan, and that it was *Peronospora Cubensis*, B. & C., first found in Cuba on *Cucurbitaceæ*, and described several years ago.

Leaving aside the interesting fact of the widely separated points where this fungus has been found the readers attention is called to the economic side of the question, for not only were the squash leaves of plants growing in the hot-bed infected, but squash and pumpkin vines in various parts of the State were seriously attacked. The writer made it a point to look for this mildew as he visited various counties, and in all cases it was met with, and in some instances was so abundant as to discolor and destroy the leaves before they had attained full size.

The squash plant, from its habit of growing horizontally upon the ground and bearing large, widely separated leaves, is an easy one upon which to study the development of this fungus. It was never found upon the young leaves, but it followed some distance after and became manifest, for example, upon the fourth or fifth leaf from the extremity of the vine. The greenish yellow patches are first seen, and these are small and irregular in shape, being bounded by the veinlets. The spores are borne upon the under side of these patches and when mature are remarkably dark in color. This color is much darker upon the squash than the cucumber, and there are other differences which would be amply sufficient to warrant a varietal name if it was not evident from the hot-bed experiment that the differences are very probably entirely due to the influence of the host. During another season, should this pest return, it is hoped that other experiments will be made to determine more fully the habits of this fungus. As yet no oospores have been found. It should also be said that the attacks of this peronospora upon the cucumber were not confined to those growing under glass, but instead almost ruined some large fields of this plant. From the fact

that this fungus is closely related to the downy mildew of the grape it is safe to conclude that an occasional spraying of the vines with either the Bordeaux mixture or the ammoniacal solution of copper carbonate would prove an effective remedy. The only difficulty will be experienced in getting the liquid upon the under surface of the leaves, where it should lodge to be of most value. It remains to be seen whether the peronospora will attack and damage the water-melon, musk-melon, citron, and other cucurbitaceous plants related to the pumpkin, squash, and cucumber.

The potato rot (*Phytophthora infestans*, DBy.) has been unusually abundant in New Jersey, so much so that many large potato-growers have secured only a small fraction of a crop. The exceptional season has been a hard blow to the rot-proof theory that some "potato-seed" dealers have advanced. As far as observed there has been no one sort of potato that failed to be attacked when the conditions of moisture, warmth, etc., were most favorable. Apparently healthy potatoes secured from areas where most of the tubers have decayed show the threads of the fungus in the tissue, and especially in that portion in the vicinity of the eyes. Many farmers are still to be convinced that there is any danger in using such potatoes for the next season's planting.

In July some of the vines of *Ampelopsis veitchii*, commonly known as the Boston ivy, were found infested with a peronospora, that proved upon examination to be the *P. viticola*, DBy., so prevalent upon the cultivated grapes. Only a few plants out of many hundreds that are to be found in this vicinity were attacked, and all of these were young vines. In no case was any long petioled or divided leaf found with the mildew. The upper and exposed side of the infested leaves became prematurely bright-colored over the attacked portion; while beneath, the conidiophores were short, quite evenly set, and when the spores were mature the characteristic frosty appearance prevailed. It is evident that this is not a favorite host for the peronospora, and in ordinary seasons the vines will very likely not suffer from it. The native species of ampelopsis (*A. quinquefolia*) was often found near mildewed plants of the Boston ivy, but in no case was any of the fungus found upon this. It is, however, a well-known host.

The last peronospora of the season is that of the cultivated violet, (*V. odorata*), and was found upon leaves sent to the station by a grower of violets for the New York market, who claims that his crop is a failure and the loss is hundreds of dollars. A comparison of this peronospora was made with *P. violæ*, DBy., as found upon *Viola tricolor* var. *arvensis* and distributed in Ellis' N. A. F. (No. 2207). The latter is placed among the species with dichotomous (uniformly forking into two parts) branching of the spore-bearing threads. In the form upon *V. odorata* there is no indication of this form, but instead it is quite like the mildew upon the grape in the manner of bearing the spores. Again, the spores of the two are different in size, shape, and color. It is true

that the size and color differences may be due to age, but in the *P. violæ* proper the spores are ellipsoidal, while in the other they are nearly perfect spheres. No oospores have yet been found. Whether it proves to be the same species or not, and that can be settled probably by cultures, the fact remains that one of our choicest of hot-bed plants is attacked by a mildew that from its destruction attracts the attention of the violet grower and should be treated with fungicides. A weak solution of the ammoniacal carbonate of copper would be likely to prove an effective remedy.

Among the species of cystopus, all of which have been abundant, only one need be mentioned here. The search, among students of this genus, for the oospores of *Cystopus ipomææ-panduranæ*, Schw. (*C. Convolvulacearum*, Otth.) upon wild sweet potato, or Man-of-the-Earth (*Ipomæa pandurata*), a miserable weed with enormous roots, has been prolonged and was rewarded only recently, as stated by Dr. Farlow in *Botanical Gazette* for August, page 187. This fungus was abundant in some parts of the State this year, doing valiant work in helping to destroy a pest in cultivated grounds. In some cases the enlargements of the stem where the oospores are borne in great numbers were many times the normal size. The particular point, however, in mentioning the species here is to announce that the leaves were found distorted, and in these thickened points the oospores abound.

It may be said in closing, that strange distortions of the flower stalks of wild mustard were met with this season, which were due to the growth within of another member of the same genus as above mentioned. It also works striking modifications of the flowers and fruit of the cultivated radish, which are often observed by truckmen who let this plant go to seed.

PREVALENCE OF ERGOT IN 1889.

By ERWIN F. SMITH.

Claviceps purpurea, (Fr.) Tul. was unusually prevalent along the east shore of Lake Michigan in the summer of 1889. At South Haven and St. Joseph I saw it in every rye-field, and it was so abundant that it could be gathered by the handful. Even scattering patches of rye in orchards, meadows, and along roadsides were infected. The best developed sclerotia were two inches long, but where a half dozen or more grew from one head they were smaller. In that part of the country it has been customary for some years to grow rye in the peach orchards as a green manure. It is sown in the autumn and ploughed down in the spring; but some portion of the crop always escapes the plow and comes to maturity. Moreover, through neglect or for other reasons, the rye is not always turned under green, so that the soil may be